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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,966	03/31/2005	James Guillet	1047-025	6278
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MICHAEL N. HAYNES 1341 HUNTERSFIELD CLOSE KESWICK, VA 22947			EXAMINER LIGHTFOOT, ELENA TSOY	
			ART UNIT	PAPER NUMBER
			1792	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/529,966	Applicant(s) GUILLET ET AL.	
	Examiner Elena Tsoy Lightfoot	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,15-17,67-72,74-76 and 82-88 is/are pending in the application.
- 4a) Of the above claim(s) 1,15-17,67,68,70 and 83-88 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 69,71,72,74-76 and 82 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>10/16/09</u> . | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 16, 2009 has been entered.

Response to Amendment

Amendment filed on October 16, 2009 has been entered. Claims 1, 15-17, 67-72, 74-76, 82-88 are pending in the application. Claims 1, 15-17, 67-68, 70, 83-88 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention and species.

Claims examined on the merits are 69, 71, 72, 74-76, and 82.

Abstract

1. Objection to the Abstract has been withdrawn.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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3. Rejection of claims 69, 71, 72, 74-76, and 82 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement has been withdrawn due to amendment.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Rejection of claims 69, 71-72, 74-76, and 82 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been withdrawn due to amendment.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 69, 71-72, 74-76, and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshioka et al (US 5,225,062).

Yoshioka et al discloses an aqueous gel composition comprising a crosslinked temperature-responsive polymeric compound comprising copolymer of *N-isopropylacrylamide* (NIPAM) (See column 3, lines 58, column 6, line 31) with other monomers including any hydrophilic monomers and hydrophobic monomers (See column 3, line 66 to column 4, line 2) such as *methyl methacrylate* (MA) (See column 4, lines 19-21), and having lower critical solution temperature (LCST) that shows, in the presence of water, hydrophobicity (i.e.

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flocculation or precipitation of the polymer) at a temperature higher than the LCST and changes to show hydrophilicity at a temperature below the LCST, and such a (phase) change is characterized by being thermally reversible (See column 3, lines 11-16). It is preferred to use a temperature-responsive polymeric compound having its LCST at 0⁰C-90⁰C (See column 3, lines 33-35). Generally, copolymerization with a hydrophilic monomer will raise the LCST, and copolymerization with a hydrophobic monomer will lower the LCST. With an appropriate selection of the monomers, a copolymer having a desired LCST can be obtained. (See column 4, lines 1-8).

As to heat release, it is well known in the art that temperature-responsive polymeric compounds release heat during their phase change*.

As to claimed range of -3.89 to 4.4⁰C, note that the Yoshioka et al's range 0⁰C-90⁰C overlaps claimed range. It is well settled that overlapping ranges are prima facie evidence of obviousness. It would have been obvious to one having ordinary skill in the art to have selected the portion of Yoshioka et al's range that corresponds to the claimed range.

It is well known in the art that properties of a polymer depend on its molecular weight and degree of crosslinking: generally, at low M.W. and low degree of crosslinking, the polymer is in a liquid state, at higher M.W and higher degree of crosslinking, the polymer is in a solid state. In other words, properties of polymers consisting of the same monomer units in the same medium would depend only on its M.W. and degree of crosslinking. Therefore, NIPAM copolymer an internally crosslinked polymer having phase change within claimed range of -3.89 to 4.4⁰C would have claimed molecular weight. Since M.W. and degree of crosslinking of a polymer determines a particle size of the polymer, it is the Examiner's position that internally

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crosslinked NIPAM copolymer having phase change within claimed range of -3.89 to 4.4⁰C would have claimed molecular weight and claimed particle size, as required by claims 74-76.

As to current amendment, claims are directed to a "composition" which is *intended* to be applied to plants. It is well settled that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. It is the Examiner's position that the composition of Yoshioka et al is capable of performing claimed intended use since the composition of Yoshioka et al would be substantially identical to that of claimed invention.

Applicant's arguments

b. Yoshioka is Not Pertinent to the Claimed Subject Matter

Applicants argue that Yoshioka allegedly discloses: an "electrophoretic gel for the separation and recovery of" "desired substances such as proteins and nucleic acids" (col. 2, lines 5-13), which is ostensibly useful "for the preparation of recombinant DNA, the cloning of DNA, the preparation of antibodies, the determination of amino acid sequences, the mapping of peptides and the analysis of amino acids" (col. 1, lines 17-20). By contrast, the present Application states that the described "composition, when applied to at least a portion of a surface of a material, can..., reduce the threshold temperature at which substantial ice formation, frost damage, and/or freeze damage to the material will occur". See paragraph 9. A person having ordinary skill in the art at the relevant time would not have found that an "electrophoretic gel for the separation and recovery of" "desired substances such as proteins and nucleic acids" to be in the same field of endeavor as a "composition" for "reducing the threshold temperature at which substantial ice formation, frost damage, and/or freeze damage to the material will occur". Consequently, Yoshioka is not pertinent to the present Application and is not available as a reference.

The Examiner respectfully disagrees with this argument. In contrast to Applicants' statement claims are directed to a "composition" which is *intended* to be applied to plants. It is well settled that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably

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distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. It is the Examiner's position that the composition of Yoshioka et al is capable of performing claimed intended use since the composition of Yoshioka et al would be substantially identical to that of claimed invention.

c. Inherency

The present Office Action implicitly admits that Yoshioka is missing certain claimed features, but counters that: "It is the Examiner's position that NIPAM copolymer an internally crosslinked polymer having phase change within claimed range of -3.89 to 4.4°C would have claimed molecular weight and claimed particle size, as required by claims 74-76." See, Page 7. Yet no substantial evidence has been presented that the missing claimed features are "necessarily present" in Yoshioka. Thus, Applicant respectfully requests provision of evidence supporting the assertion that Yoshioka's alleged "NIPAM copolymer" would have "the claimed molecular weight and claimed particle size, as required by claims 74-76." To the extent that the present Office Action or any future Office Action intends to rely on inherency to support a claim rejection, Applicant respectfully traverses such reliance as improperly supported, respectfully requests provision of proper evidence supporting such rejection, and respectfully requests a detailed explanation of how the "missing descriptive material is necessarily present, not merely probably or possibly present", in any prior art reference cited to support such rejection.

The Examiner respectfully disagrees with this argument. It is well known in the art that properties of a polymer depend on its molecular weight and degree of crosslinking: generally, at low M.W. and low degree of crosslinking, the polymer is in a liquid state, at higher M.W and higher degree of crosslinking, the polymer is in a solid state. In other words, properties of polymers consisting of the same monomer units in the same medium would depend only on its M.W. and degree of crosslinking. Therefore, NIPAM copolymer an internally crosslinked polymer having phase change within claimed range of -3.89 to 4.4°C would have claimed molecular weight. Since M.W. and degree of crosslinking of a polymer determines a particle size of the polymer, it is the Examiner's position that internally crosslinked NIPAM copolymer having phase change within claimed range of -3.89 to 4.4°C would have claimed molecular weight and claimed particle size, as required by claims 74-76.

d. Missing Claim Limitations

Claim 69 states, inter alia, yet no substantial evidence has been presented that the applied portions of the cited references teach (i.e., disclose and/or enable), alone or in combination, a "dispersion of solid particles". Also, claim 69 states, inter alia, yet no substantial evidence has been presented that the applied portions of the cited references teach (i.e., disclose and/or enable), alone or in combination, "the composition adapted to form a coating over at least a portion of a surface of a plant, the coating weighing from about 0.5% to about 3% of a weight of a coated portion of the plant".

The Examiner respectfully disagrees with this argument for the reasons discussed above.

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8. Claims 69, 71-72, 74-76, and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blum (US 6,180,562) in view of Tanaka et al (US 4732930).

Blum describes an aqueous composition comprising (solid particles of) a crosslinked polymer (claimed internally substantially crosslinked polymer) (See column 10, lines 54-56) or a polymer having a relatively low amount of crosslinking (i.e. being internally crosslinked) (See column 10, lines 37-42) for application to the surfaces of plants for protecting the plants from damage caused by frost and/or freeze (See column 1, lines 10-12) by releasing heat during freezing transition (See column 4, lines 21-25). Blum teaches that heat is released over a temperature range because the polymers in the compositions exhibit a broad freezing transition range beginning at about 32⁰, preferably in a range of from **at least about 32⁰F** to about 27⁰F or lower which enables the polymers to release their latent heat of fusion over a broad temperature range (See column 4, lines 21-30). It is the Examiner's position that "**at least about 32⁰F**" covers claimed 40⁰F.

Blum further teaches that the desired freezing transition range of a polymer and the amount of heat released depends on the particular polymer used (See column 10, lines 13-36) and the degree of crosslinking of the polymer (See column 10, lines 13-56), and its level of hydration, among other factors (See column 8, lines 62-65). In other words, Blum teaches that *any* hydrogel polymers having optimum **level of hydration** and **degree of crosslinking** that release heat over a desired range of dropping ambient temperature are suitable for protecting plants because Blum does not limit its teaching to particular polymers.

Blum fails to teach that the polymer is internally crosslinked polymer comprising at least one hydrophobic substituent and NIPAM substituent that releases heat over a range of dropping ambient temperatures beginning at about 40°F (Claim 1).

Tanaka et al teaches that hydrogel polymers with desired strength, **swelling** degree, **degree of crosslinking**, phase transition temperature and the like may be made by crosslinking a main isopropylacrylamide (NIPAM) monomer using a crosslinking agents such as ethylene glycol dimethacrylate, glycerine triacrylate or divinylbenzene (claimed hydrophobic substituent) (See column 2, lines 52-66).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have made a hydrogel polymer in Blum by crosslinking NIPAM using a crosslinking agent such as ethylene glycol dimethacrylate, glycerine triacrylate or divinylbenzene with the expectation of providing the desired strength, **swelling** degree, **degree of crosslinking**, phase transition temperature, as taught by Tanaka et al.

9. Claims 69, 71-72, 74-76, and 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blum (US 6,180,562) in view of Savignano et al (US 5,653,054), and further in view of Tanaka et al '930.

Blum is applied here for the same reasons as above.

As to solid particles of 1-1000 nm, Blum teaches that the composition further comprises *freezing point depressants*, such as monohydric alcohols, small chain dihydroxy and polyhydroxy alcohols, such as *propylene glycol* (See column 9, lines 20-26).

Blum does not disclose that the polymer is in the form of solid particles of internally crosslinked polymer comprising at least one hydrophobic substituent and at least one hydrophilic

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substituent having a molecular weight in the range of about 500,000 to about 50,000,000 (Claim 3) and diameter in the range of 1-1000 nm (Claims 2, 4, 6).

However, Blum teaches in the BACKGROUND OF THE INVENTION that a composition comprising a mixture of water, a water-soluble *freezing point depressant such as propylene glycol*, and a water dispersible thickening agent such as a crosslinked polyacrylic acid polymer was known to be used in the art for preventing or retarding frost formation on grass or leafy plants and described, for example by U.S. Pat. No. 5,653,054 to Savignano et al (See column 2, lines 8-20). Savignano et al '054 teaches that a suitable water dispersible thickening agent includes a **copolymer of acrylamide with acrylic acid ester** (claimed hydrophobic substituent), or preferably a crosslinked polyacrylic acid polymer (See column 3, lines 26-31) having a molecular weight in the range of about **750,000 to about 4,000,000** (See column 3, lines 15-18) prepared by polymerizing a mixture of acrylic acid (claimed hydrophilic water soluble monomer) and up to about 35 wt % of a copolymerizable monomer, e.g., an alkyl acrylate or methacrylate (claimed hydrophobic substituent), in the presence of a *crosslinking agent* having two or more $\text{CH}_2=\text{C}<$ groups per molecule, e.g., *divinyl benzene* or butadiene (i.e. crosslinked *internally*) (See column 3, lines 18-25).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a crosslinked polymer of Savignano et al in a composition of Blum in addition to freezing point depressant such as propylene glycol with the expectation of providing the desired preventing or retarding frost formation on grass or leafy plants since Blum does not limit its teaching to particular crosslinked polymers, and Savignano et al teaches that a copolymer of acrylamide with acrylic acid ester or crosslinked polyacrylic acid polymer together

with freezing point depressant such as propylene glycol is suitable for the use in plant protecting compositions.

It is the Examiner's position that the crosslinked polymer of Savignano et al having M.W. of **750,000 to about 4,000,000** is *internally* crosslinked polymer comprising at least one hydrophobic substituent and at least one hydrophilic substituent in the form of solid particles having diameter in the range of 1-1000 nm, as required by claims 74, 76, 82.

As to a crosslinked polymer comprising NIPAM, Tanaka et al teaches that hydrogel polymers with *desired* strength, *swelling* degree, *degree of crosslinking*, phase transition temperature and the like may be made by crosslinking a main isopropylacrylamide (NIPAM) monomer using a crosslinking agents such as ethylene glycol dimethacrylate, glycerine triacrylate or *divinylbenzene* (claimed hydrophobic substituent) (See column 2, lines 52-66).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have made a hydrogel polymer in Blum in view of Savignano et al by crosslinking NIPAM using a crosslinking agent such as ethylene glycol dimethacrylate, glycerine triacrylate or divinylbenzene with the expectation of providing the desired strength, swelling degree, degree of crosslinking, phase transition temperature, as taught by Tanaka et al.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy Lightfoot whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Friday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy Lightfoot, Ph.D.
Primary Examiner
Art Unit 1792

November 17, 2009

/Elena Tsoy Lightfoot/